Indian Renewables

A Deep Dive Into Operating Performance

S&P Global Ratings

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Key Takeaways

- We expect wind power projects to record better volumes in fiscal 2024 as is reflected in all-India level load factors. 2H 2023 (calendar year) wind load factor was **20% higher year-on-year**, reflecting some recovery.
- Renewable power generation recovered in fiscal 2023 but remained short of P90 estimate at the portfolio level. **P90 underperformance reduced to 0.5% in fiscal 2023** from 1%-2% over fiscals 2021-2022.
- Poor wind performance is often cited as a key driver for P90 misses. **Wind portfolio only achieved P90 once over the last eight years.** Higher underperformance in the states of Andhra Pradesh, Karnataka, and Maharashtra.
- Persistent P90 misses at portfolio level in India also indicates **aggressive resource estimation** at the outset. About **70%** of projects **missed P90 estimates** over fiscals 2021-2023, more than levels of 50% in prior years.
- Some players have proactively revised resource estimates considering continuing weaker generation. Robust P90 estimates will lead to a more stable performance and better cash flow predictability.
- Newly commissioned wind assets can benefit from improved technology and **higher plant load factor (PLF) of about 35%** (80% increase over the past decade).
- Cash collection from state-owned distribution companies has improved across the portfolio driven by the Late Payment Surcharge (LPS) Scheme. On a steady state basis, we expect renewable players to face working capital outflow but at a smaller amount relative to earnings at **about 10% of EBITDA** (down from 20% previously).

Operating Performance

Receivables Update

Scope Of Coverage

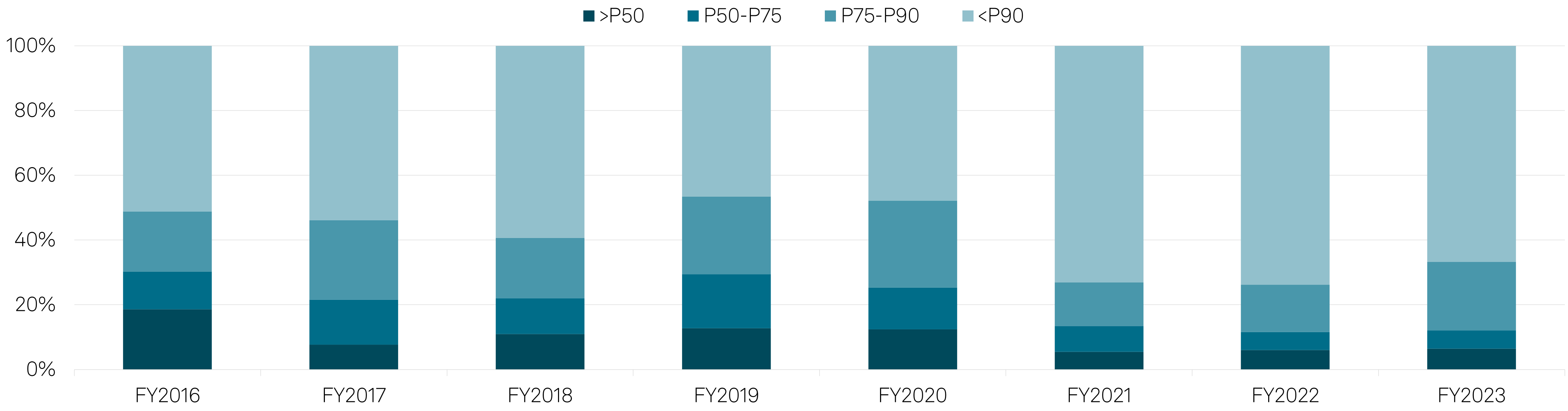
- We have analyzed the project-wise operating performance from fiscals 2016 to 2023.
- Projects are included from Greenko Energy Holdings*, ReNew Power Pte. Ltd.*, Continuum Green Energy Ltd., Parampujya Solar Energy Private Ltd. Restricted Group, Adani Green Energy Ltd. Restricted Group 2, and the Indian renewable projects of Vena Energy. We have also included assets of confidentially rated Indian renewable players.
- We have only considered projects operational for the entire year (stabilized portfolio). We have used ~1,325 data points to remove the impact of seasonality when assessing resource risk.
- The industry uses probability estimates for generation meeting certain levels of production:
  - **P90 (1-year):** Generation level expected to be met in at least **90% of years**, a conservative approach.
  - **P75 (1-year):** Generation level expected to be met in at least **75% of years**.
  - **P50 (1-year):** Generation level expected to be met in at least **50%**, a more aggressive estimate.

*Our ratings on Greenko Energy Holdings and ReNew Power Pte. Ltd. were withdrawn in 2023.

Significant P90 Misses Continue At Portfolio Level

- Over the last three years, we've seen a greater percentage of P90 misses, at about **70% levels**.
- **Poor wind availability** "attributed" to the underperformance.
- Persistent P90 misses could also indicate **aggressive resource estimates.** Some players have revised their P90 estimates lower.

P90 misses have increased over fiscals 2021-2023

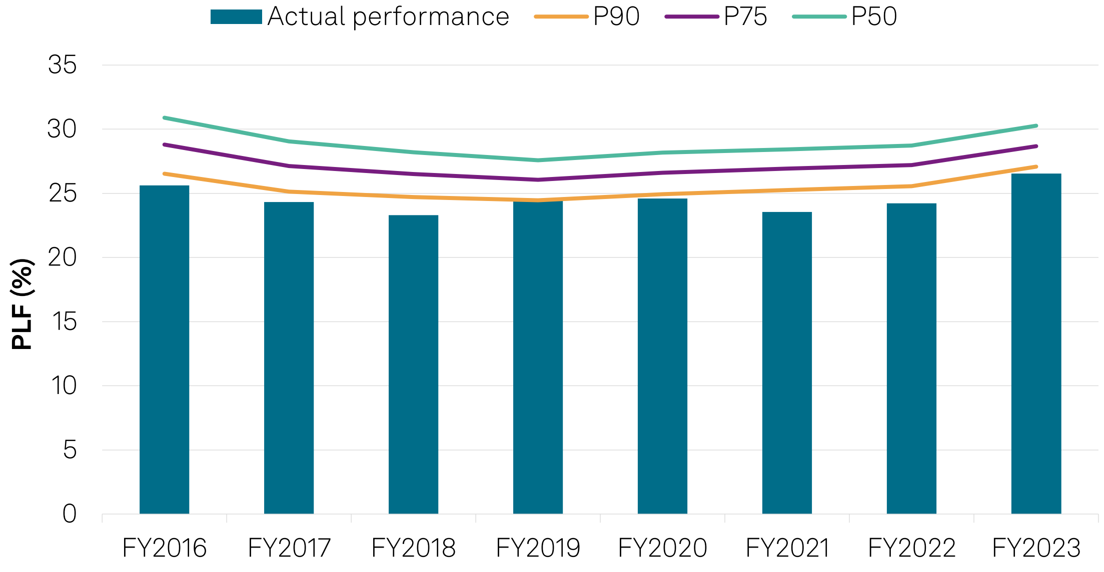


FY--Fiscal year ending March for Indian companies and December for Vena Energy. Sources: Company data, S&P Global Ratings.

Operational Performance Is Still Falling Short

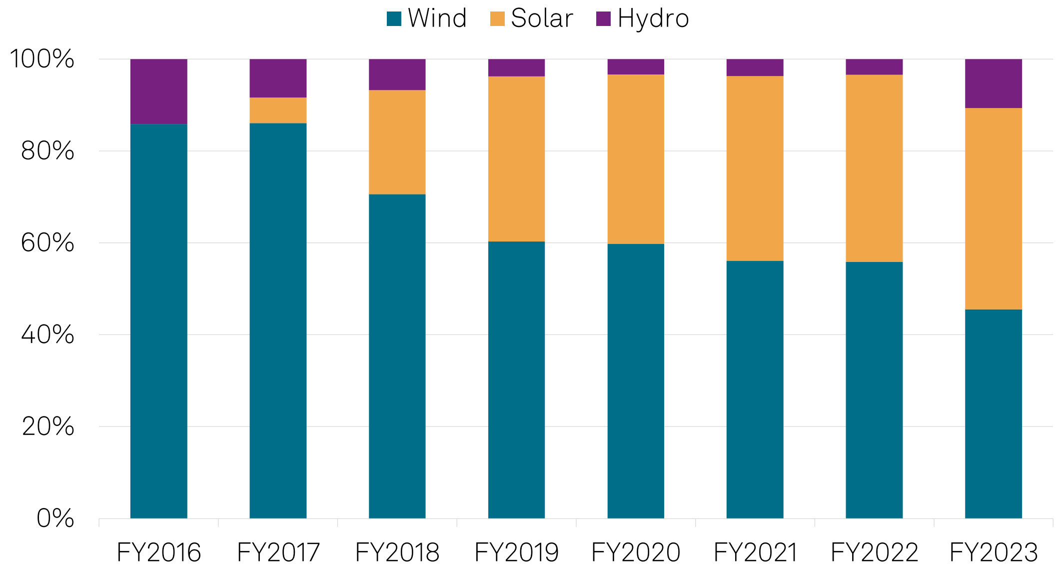
- P90 underperformance gap has **narrowed to 0.5%** in FY2023 compared with about 2% in FY2021. This also reflects some industry-wide recovery, but the pace has been slow.
- An increasing mix of solar and hydro projects may also provide more stability and predictability to generation estimates.

Indian renewables consistently fail P90 levels



FY--Fiscal year ending March for Indian companies and December for Vena Energy. PLF--Plant load factor. Sources: Company data, S&P Global Ratings.

Increasing resource diversity should stabilize performance



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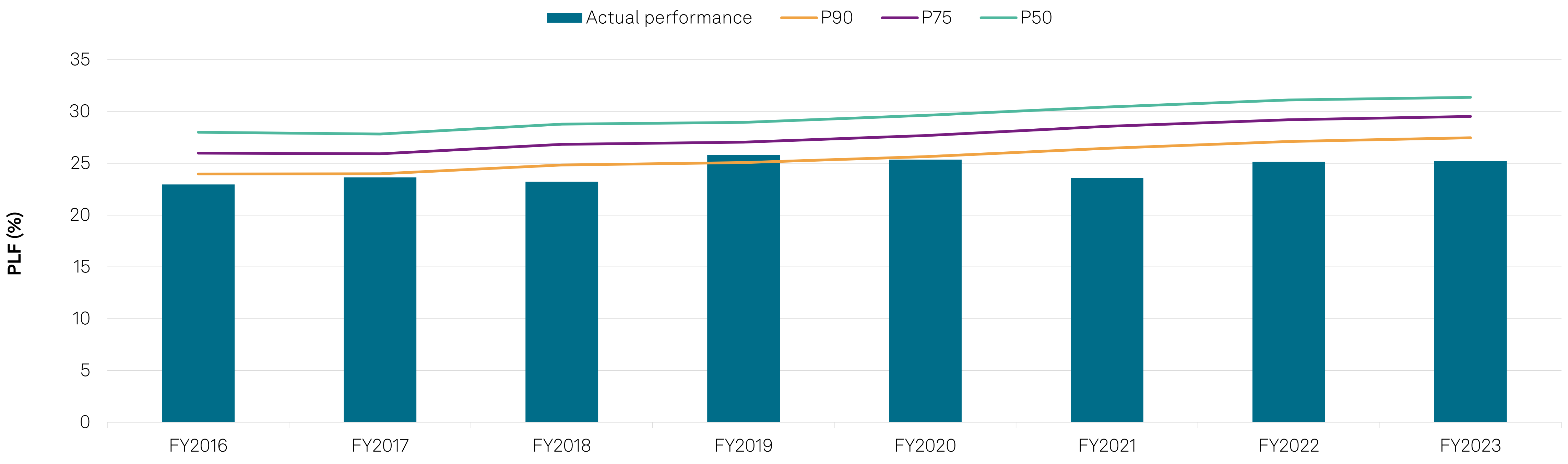
Largely Weak Wind-Power Generation Remains A Drag On Earnings

- **P90 misses continue** due to persistent poor wind resource.
- Wind portfolio only **achieved P90 once in the last eight years.**
- Underperformance against P90 moderated to about 2% over FY2022-FY2023 vs. 3% in FY2021. Still means ~5% lower cash flows.



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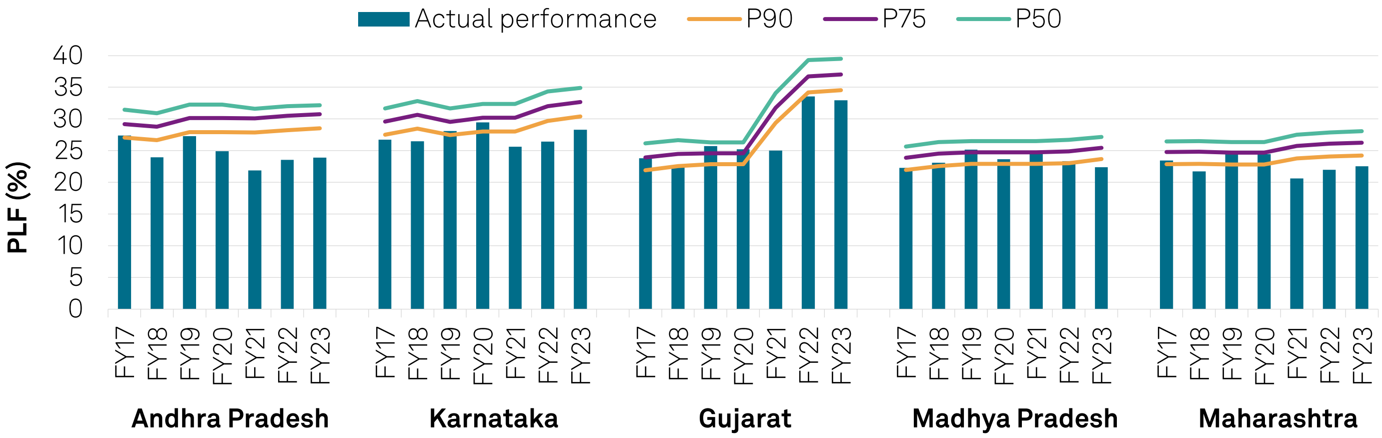
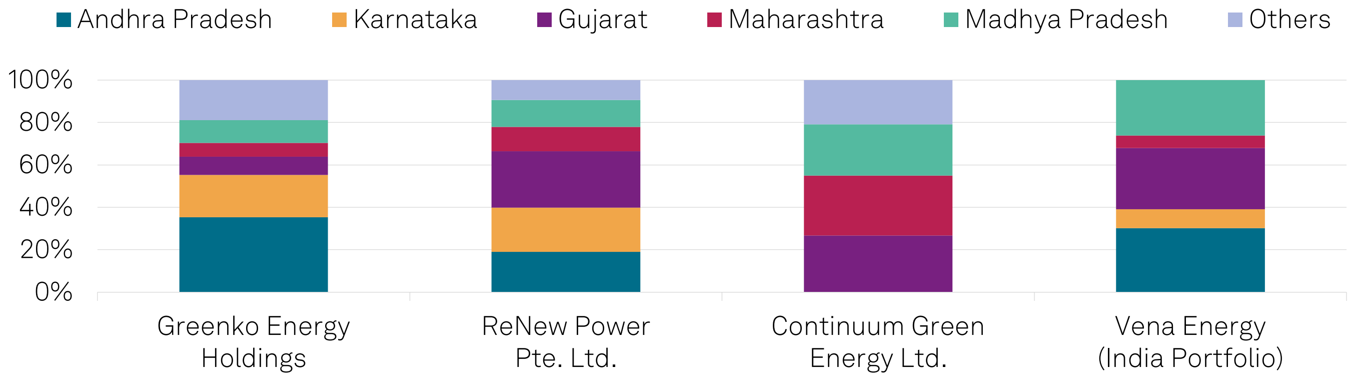
Wind-Power Generation Varies Materially Across States



Geographic diversity of wind projects (2023)*

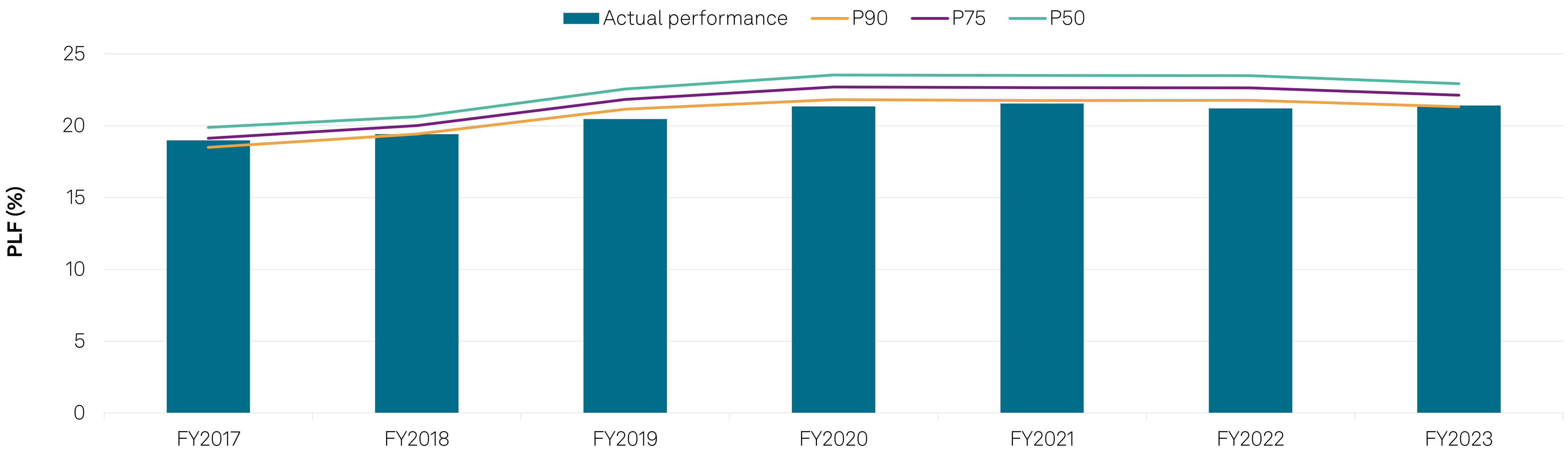


*Based on stabilized assets which have been operational for full year. FY--Fiscal year ending March for Indian companies and December for Vena Energy. PLF--Plant load factor. Sources: Company data, S&P Global Ratings.

- Good geographic diversity of projects across India should mitigate weaker operating performance in some states.
- **Higher wind-power underperformance** in Andhra Pradesh (combination of poor wind resource and curtailment issues), Karnataka and Maharashtra.
- Companies with more than 50% exposure to these states (e.g., Greenko and ReNew) have higher P90 wind underperformance (2%-5%) compared to peers (less than 2%).
- Gujarat and Karnataka recorded the **highest average wind PLF** at ~27% over the past seven years.

Solar-Power Generation Is Largely In Line with P90 Estimates

- Solar portfolio **mostly meets P90 estimates**, reflecting a more stable performance than wind. Level of underperformance in certain years is also lower (e.g., 0.2% in FY2021) compared to wind assets (e.g., 3% in FY2021).
- Addition of more solar assets and hybridization will help moderate resource risks for renewable companies.



FY--Fiscal year ending March for Indian companies and December for Vena Energy. PLF--Plant load factor. Sources: Company data, S&P Global Ratings.

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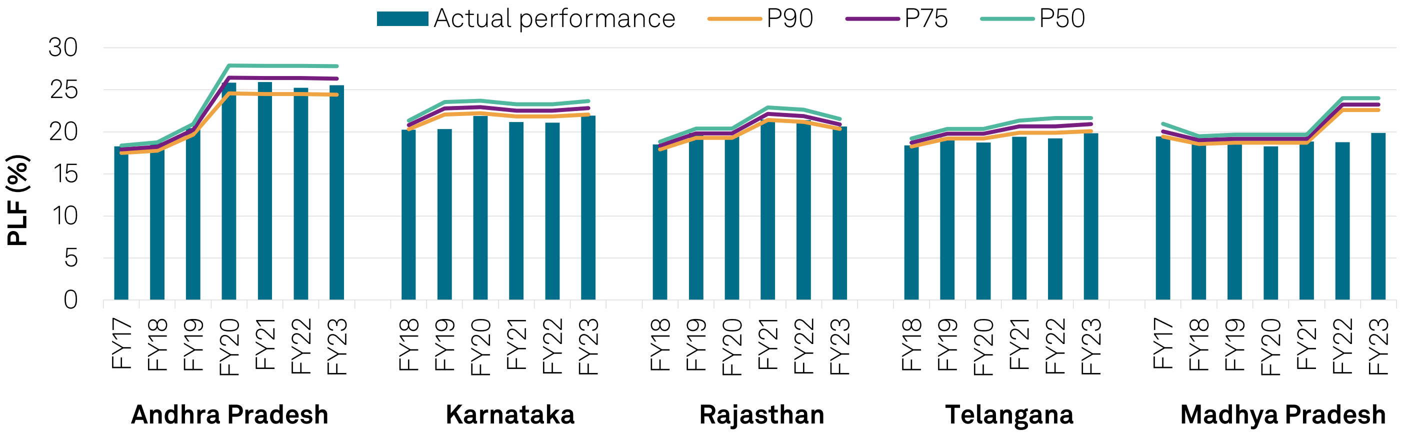
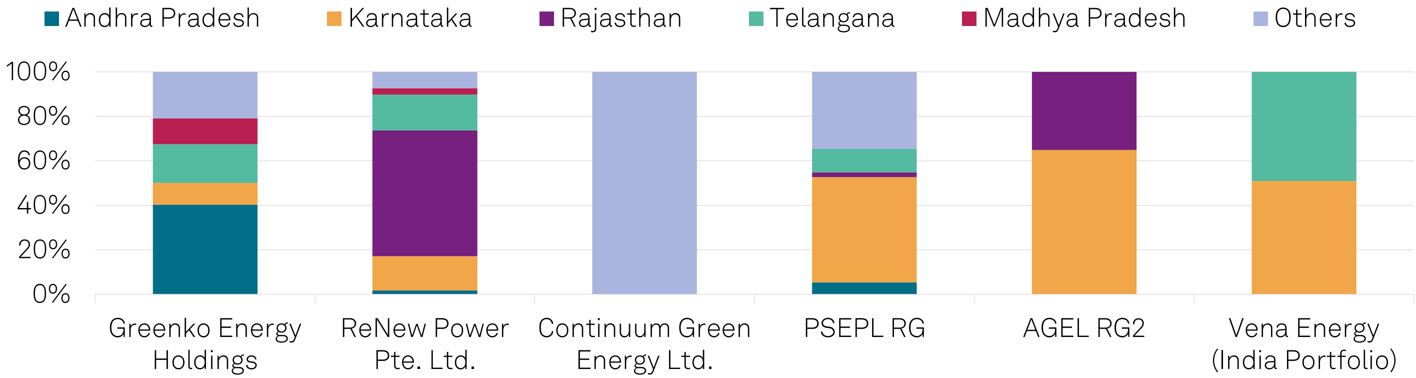
Solar-Power Generation Is Largely Consistent Across States



Geographic diversity of solar projects (2023)*



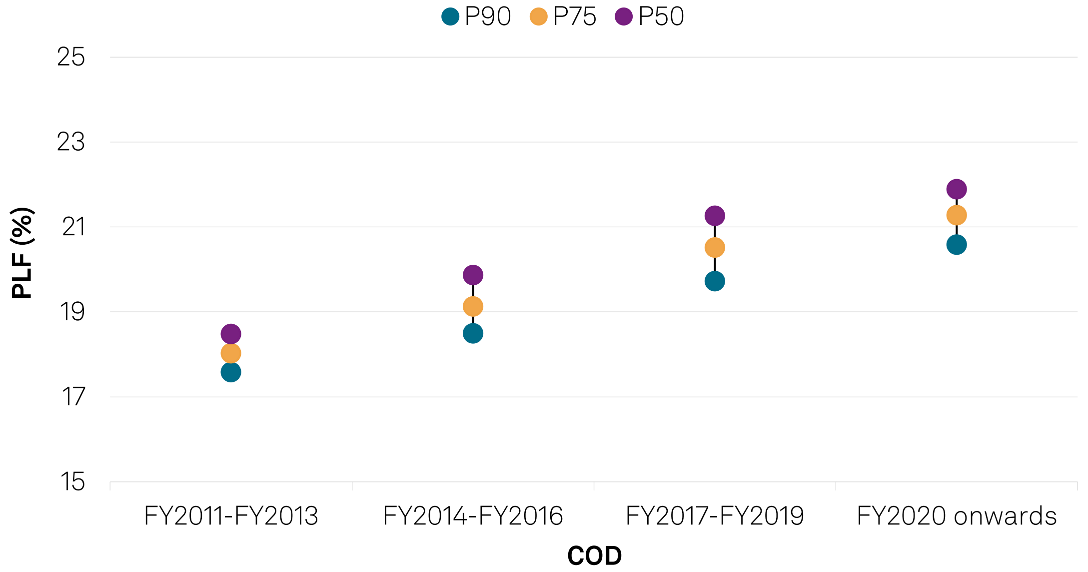
*Based on stabilized assets which have been operational for full year. FY--Fiscal year ending March for Indian companies and December for Vena Energy. PSEPL--Parampujya Solar Energy Private Ltd. Restricted Group. AGEL RG2--Adani Green Energy Ltd. Restricted Group 2. Sources: Company data, S&P Global Ratings.

- Most states have consistently met P90 estimates. Only a few states have seen underperformance particularly in last two years e.g., Madhya Pradesh (about 3%) and Karnataka (about 1%).
- Any P90 underperformance at the company level is **typically less than 1%.** Diversity of solar assets across states helps support this.
- Average solar PLF was the highest in Andhra Pradesh at about 23% over the past seven years, versus 20%-21% across other states.

Probability Estimates Are Rising For Solar And Wind

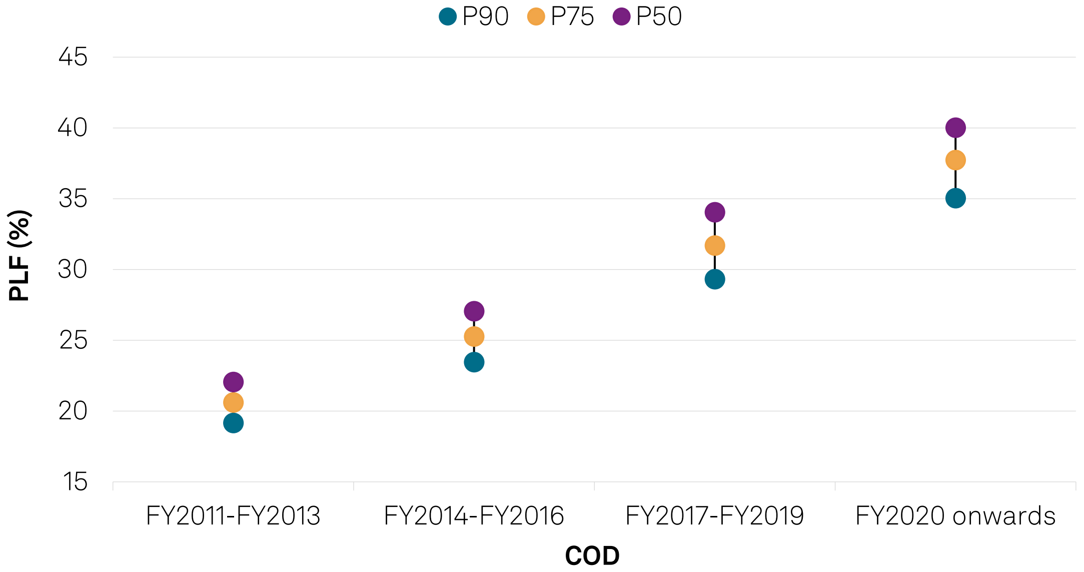
- Probability estimates for newly commissioned **wind assets have increased by ~80%** over the last decade, significantly higher than solar at ~20%. This reflects some technology variations where newer wind assets benefit from higher hub height and larger rotor blades.
- Some wind assets have obtained higher generation at P90 estimates of ~35% over the past few years, suggesting that such estimates can be attained in India.

Solar P estimates (by COD) are trending higher...



COD--Commercial operations date. FY--Fiscal year ending March for Indian companies and December for Vena Energy. P--Probability. PLF--Plant load factor. Sources: Company data, S&P Global Ratings.

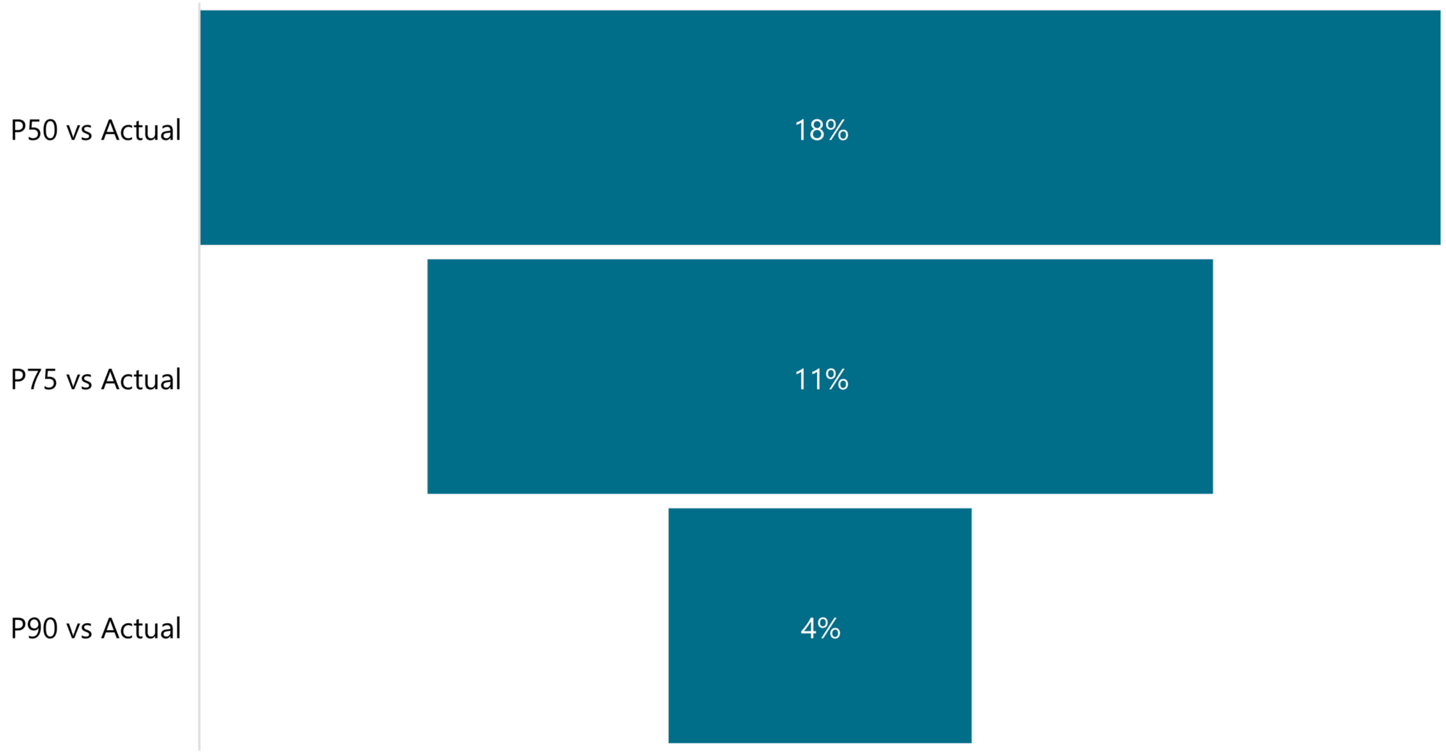
And even more so for wind P estimates (by COD)



COD--Commercial operations date. FY--Fiscal year ending March for Indian companies and December for Vena Energy. P--Probability. PLF--Plant load factor. Sources: Company data, S&P Global Ratings.

Underperformance Of P Estimates Has Significant Cash Flow Hit

% difference in P estimates against actual performance



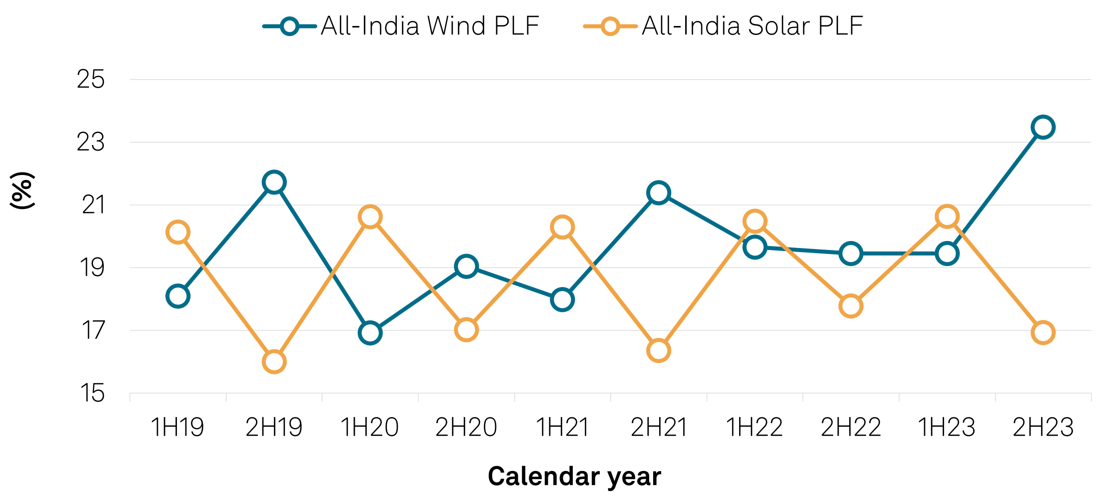
P--Probability. Sources: Company data, S&P Global Ratings.

- Generation shortfall hurts EBITDA.
- Projects assuming P50 generation (typically solar) have about **18% lower cash flows** than company estimates.
- Projects assuming P75 generation (typically wind) have about **11% lower cash** flows than company estimates.
- Projects assuming P90 generation have about **4% lower cash flows** than company estimates. This reached about 8% in FY2021.

Wind-Power Likely To Recover In Fiscal 2024; Further Forecast Uncertain

- We typically apply a **1%-2% haircut to the P90 estimate for wind projects** in our forecast, to capture wind variability and past underperformance.
  - 1% underperformance leads to 2%-2.5% lower EBITDA in our estimates.
  - 2% underperformance leads to 4%-5% lower EBITDA in our estimates.
  - 3% underperformance leads to 6%-8% lower EBITDA in our estimates.
- We typically adopt **P90 generation levels for solar**, given past track record.

Wind-power generation shows strong growth in 2H 2023



PLF--Plant load factor. Source: Central Electricity Authority of India.

Weighted average P estimates of projects analyzed

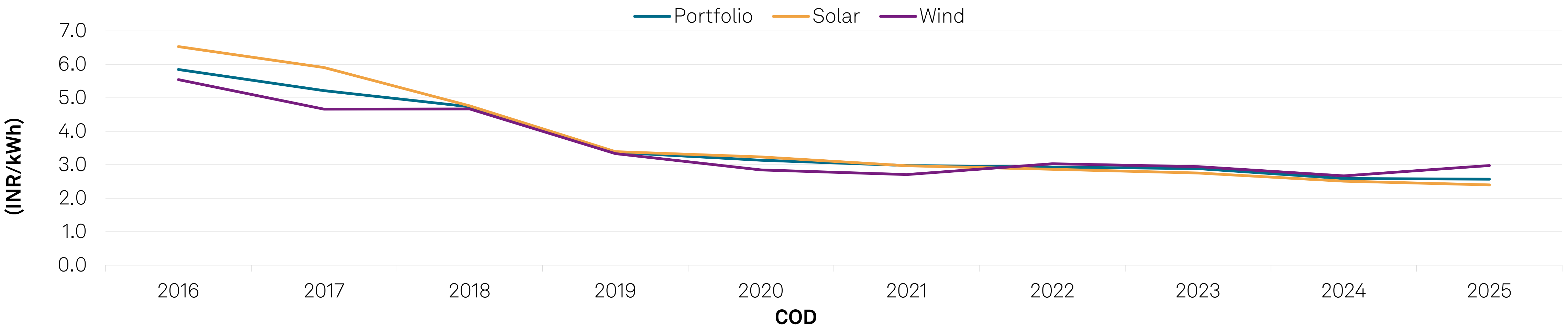
	Wind	Solar
P50	29.5%-31.5%	23.0%-24.0%
P75	27.5%-29.5%	22.0%-23.0%
P90	25.5%-27.5%	21.0%-22.0%

P--Probability. Sources: Company data, S&P Global Ratings.

Competitive Pricing For Renewables Can Be A Double-Edged Sword

- Fixed tariffs support **cash flow predictability**. However, tariffs are trending lower and this may **impact future returns**, particularly in a higher interest rate and inflationary environment. Price mismatches can arise from fixed tariff over 25-year PPA tenor vs. potential changes in funding and operating costs over the period.
- Commercial and industrial tariffs benefit from annual inflation adjustments which help offset resource risk to an extent.
- Solar and wind tariffs for upcoming projects are in a range of INR2.5-3/kWh. Recent tenders in 2023 have also closed at similar levels at an average tariff of INR3.08/kWh (per S&P Commodity Insights). Renewables with storage typically fetch higher tariffs at about INR4-5/kWh, to compensate for higher costs.

Weighted average tariff contracted with state-distribution companies based on COD



COD--Commercial operations date. FY--Fiscal year ending March for Indian companies and December for Vena Energy. INR--Indian rupee. kWh--Kilowatt hour. Sources: Company data, S&P Global Ratings.

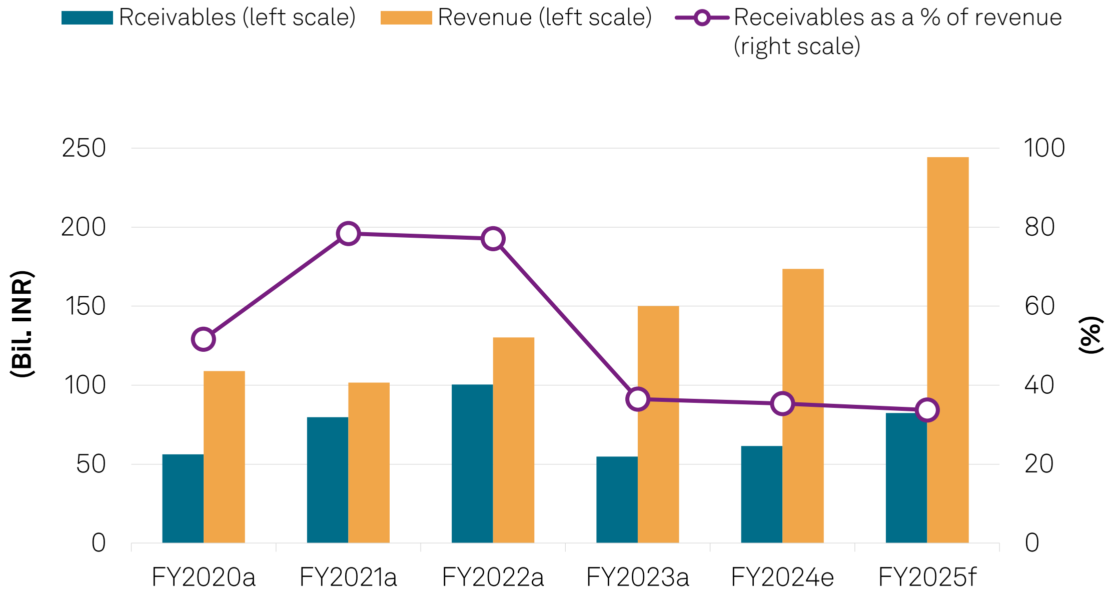
Operating Performance

Receivables Update

Improving Receivables Positions Across Portfolios...

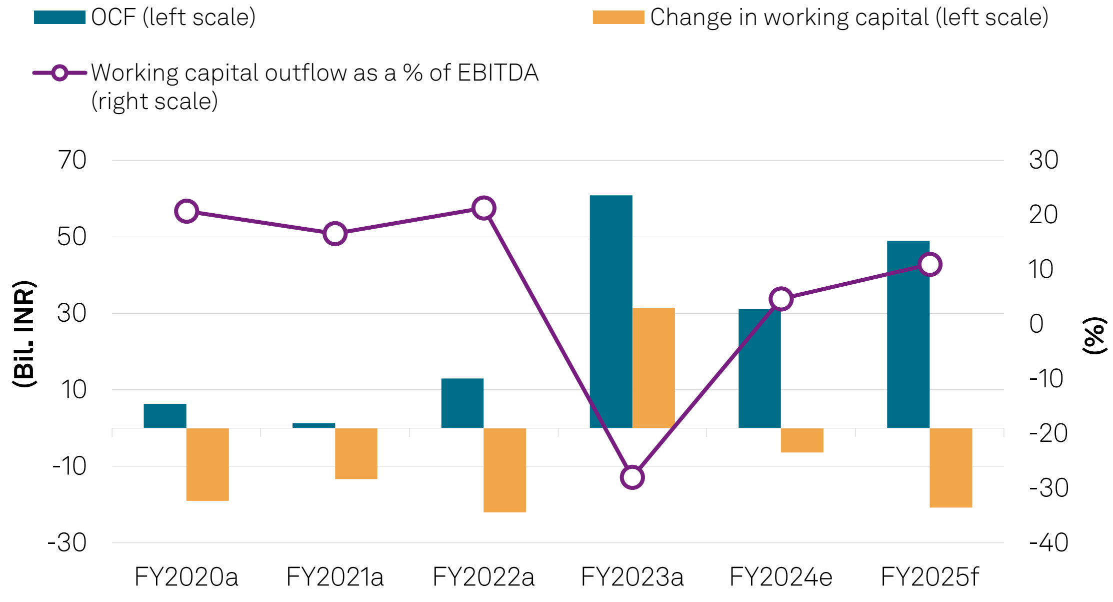
- We expect **receivables-related drags on cash flows to be more manageable** than for previous years. Working capital outflows will likely continue but at a smaller amount relative to earnings at about **10% of EBITDA**, reducing from nearly 20% previously.
- Receivables plunged to 36% of revenue in FY2023 (peak = 80%). This shows the late payment surcharge scheme rolled out in 2022 is clearing massive over-dues. Payments on current dues or instalments by state distribution companies have also been timelier.

Receivables drag to ease over the next two years



a--Actual. e--Estimate. f--Forecast. FY--Fiscal year ending March. Sources: Company data, S&P Global Ratings.

Working capital outflows to continue but manageable



a--Actual. e--Estimate. f--Forecast. FY--Fiscal year ending March. OCF—Operating cash flows. Sources: Company data, S&P Global Ratings.

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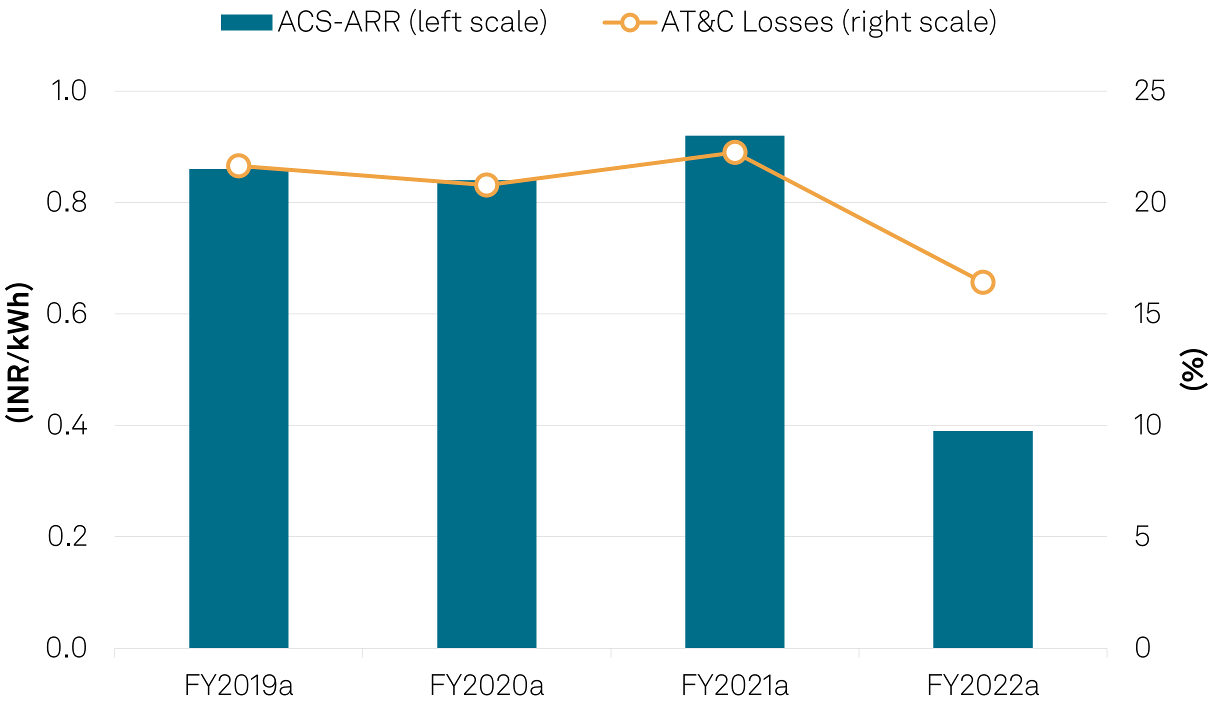
...But State Discoms' Credit Quality Remains A Key Watchpoint

State discoms' operations are improving, even for weaker players



a--Actual. ACS--Average cost of supply. ARR--Average realizable revenue (cash adjusted basis). AT&C--Aggregate technical and commercial. Discoms--Distribution companies. FY--Fiscal year ending March. INR--Indian rupee. kWh--Kilowatt hour. Source: Power Finance Corporation Ltd.

- Sustained timely payment collections from state discoms hinge on structural improvement in discoms' credit quality.
- The LPS scheme has improved system liquidity through additional borrowings for discoms but doesn't make their operations more sustainable.
- However, we believe discoms' financial health is gradually improving supported by **lower AT&C losses and higher tariffs** to help offset their cost burdens. **AT&C losses fell to ~16%** in FY2022 from ~22% in previous years.
- Large-scale installation of smart meters is helping contain power theft.
- **ACS-ARR gap more than halved** to INR0.39/kWh in FY2022 from INR0.92/kWh in FY2021.
- A sustainable structural improvement hinges on continuing efforts to close the ACS-ARR gap and political will at the state levels.

Related Research

- Assessing Project Finance As Way To Unlock India's Renewables Potential, Feb. 22, 2024
- Industry Credit Outlook 2024: APAC Utilities, Jan. 10, 2024
- Asia-Pacific Utilities Outlook 2024: Earnings Recovery Should Temper Higher Transition Spending, Nov. 15, 2023
- Industry Report Card: Solar- And Wind-Powered Renewables, May 17, 2023
- Asia-Pacific’s Different Pathways To Energy Transition, March 30, 2023
- India Renewables: Growth Trumps Deleveraging, April 18, 2022

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